NATIONAL RADIO INSTITUTE

Established 1914

WASHINGTON, D. C.

DISCUSSION SHEET - PLACE WITH LESSON 7FR

I believe I can say without exaggeration that when you have mastered this lesson you will know more about condensers and their action in electrical circuits than most practical electricians and some radio-men who may have been actually working with condensers for years. I know men personally who have tried their best to figure out what goes on in a condenser when an A.C. current "flows through it," and why a D.C. current won't flow through it, and they haven't been able to do it. Even with the explanation given in various books on electricity many of them can't "get to first base."

But you just study this lesson carefully, take it slowly and thoroughly, and you'll be surprised that any one should ever find the subject difficult.

It will help you greatly if you visualize electrons in a circuit - you remember that when a current flows through a circuit, electrons pass through the conductors, going from one atom to the next. Then remember also that a battery or other source of e.m.f. does not FURNISH new electrons, it merely puts the electrons in the circuit into motion.

When a D.C. source of e.m.f. is connected across a condenser, electrons are drawn from one side of the condenser and forced into the other side through the connecting wires. Now if we disconnect the source of e.m.f. the condenser remains charged, there are more electrons on one side than on the other - and there is a difference of potential across the condenser.

If a wire is run from one side of the condenser to the other, the condenser will discharge through the wire, the extra electrons on one side will return to the other side and there will be the same number of electrons on both sides again.

No electrons ever pass from one plate to the other through the dielectric - unless the condenser is defective.

This is true even in the case of A.C. where we say that current "flows through" the condensers. Here the condenser plates are alternately charged and discharged - the A.C. current flows in and out of the condenser with each cycle. The important thing is that the condenser provides "storage space" into and out of which the current can move and as you know, it is current MOTION that makes possible the accomplishment of electrical work.

D.C. won't "flow through" a condenser because after the initial charge the condenser develops a back pressure equal to the charging pressure and current flow stops.

In the latter portion of the lesson we go on to study oscillatory circuits and resonance. In one lesson, only introductions to these very important subjects can be given. They are so important however that we will study them again and again throughout the course. Learn all you can about them from this lesson - then you will be ready for the next lessons which deal with resonance, the phenomenon on which radio reception and transmission are based.

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DISCUSSION SHEET - FOLD AND PLACE WITH LESSON 9FR

There are several places in this lesson where the material is presented in a way that is a decided departure from the conventional manner. For example, we teach you that electromagnetic induction from the primary to the secondary of a transformer is the result of changing flux linkages. While engineers have been talking in terms of flux linkages for years, writers of text books in general have stuck to the old manner of speaking and they talk about conductors cutting lines of force.

Of course we mention this too, but the idea we want you to have after studying this lesson is that changes in flux linkages are responsible for all induced e.m.f.'s. This is all brought out clearly in Figs. 2, 3, 4 and 5. You will notice that we can change the flux linkages in several ways - by moving one of the coils within the other, by moving the larger coil, or by causing the current flowing through one coil to change in magnitude. In any case, there is motion.

Now refer to Fig. 4c. There should of course be a battery in the buzzer circuit. When the switch is closed the buzzer will alternately close and open the circuit and cause the flux about the larger coil to increase and decrease. As the flux moves up and down, its linkages with the smaller coil change and an alternating voltage is induced in the smaller coil.

On page 4 there is a misprint. In the sixth line starting with the last word, change to "The second coil has 100 magnetic lines of force threading through it when maximum current flows in the first coil." On page 6 in the tenth line, we speak of the plate of a tube as a source of e.m.f. You will often see a vacuum tube referred to as a generator of e.m.f. and as the output of the tube is considered as the plate current, the meaning of the sentence will be perfectly clear.

In the seventh line of page 7, change to "lines 1, 2, 3 and 4." Of course, "4" in the next line should be omitted.

Near the bottom of the same page we talk about a complete magnetic circuit. Figure 6b will make clear what is meant. The iron core on which the windings are placed, is closed and the flux can flow right around it, just as current flows in a complete circuit.

In the fourth line of page 9, the statement is made that "The power must be the same." This is true only if there are no losses present in the core. However, there are always some losses so that the output power is always less than the input power. The important thing is that it can't be greater.

On the next page, change 100 in the third and fifth lines to 110 and in the fourth line change 11.5 to 13.6 turns.

The letter L in the fourth line of page 12 refers to the total inductance, including the inductance L1, L2 and the mutual inductance.

On page 15, cross out the whole third sentence under the illustration.

In the eighth line from the bottom of page 19, the printer left out part of the sentence. It should read, "But capacitive reactance shifts phase in a direction opposite to the shift caused by inductive reactance."

On page 24 you will notice the abbreviation μf used twice. This is the same as mfd. In your general reading you will find microfarad abbreviated both ways. On page 28, line fifteen, Fig. C refers to Fig. 21C.

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